

Capturing the social and cultural values of European forests: insights from “EFORWOOD”

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ABSTRACT

This paper draws from research carried out as part of the EU-funded project ‘EFORWOOD-IP: Tools for Sustainability Impact Assessment of the European Forestry-Wood Chain’. The paper reports on a literature review to develop a generic template of social and cultural values and indicators associated with forests in Europe, and research to develop ‘forest recreational use’ as an indicator to assess the social impacts of changes in forest management as part of European impact assessment procedures.

KEY WORDS

social and cultural values, forest recreation, indicators, sustainability impact assessment, EFORWOOD

INTRODUCTION

The social and cultural values and meanings people attach to the natural environment are increasingly recognised throughout the forestry sector, but several political and conceptual barriers still need to be addressed before they can be fully incorporated into policy-making, and translated effectively into actions on the ground. Part of the problem lies in the intangible and inter-linked character of many social and cultural values, which makes it difficult to justify investments that aim to enhance them, since their public benefits are hard to describe, measure and evaluate. Yet the benefits people derive, for example, through identification with particular forests, or by seeing forests as symbols of wilderness, historical continuity, or spiritual dimensions in their lives, are undeniably important, and often rank higher in public

consultations than the tangible ‘traditional’ economic benefits such as timber production (O’Brien 2005, Edwards 2006).

The dominant kind of evidence favoured by decision-makers is expert-driven, quantitative, and, if possible, expressed in terms of money values. The discourse of sustainability, and the ‘triple bottom line’ approach to sustainability impact assessment now obliges European policy-makers to capture the social consequences of policies and programmes. In practice the rich diversity of values that the public associates with forests are often reduced to narrow measures such as levels of employment and salaries of forest sector workers.

Much progress has been made by environmental economists to derive economic values for non-market social and cultural externalities such as the value of forest recreation, and the contribution of forests and trees

to landscape attractiveness, economic regeneration and rural tourism. But their methods remain controversial and values calculated for particular locations and contexts may not apply elsewhere with sufficient credibility. In contrast, descriptive evidence, such as quotes taken from interviews and focus groups with forest-based communities or recreational users, is increasingly used to great effect. Although qualitative evidence is criticised by scientists for being subjective and anecdotal, its legitimacy and impact is enhanced by claims that it can represent the 'genuine' voices and values of particular groups in society. When linked to participatory processes that seek to engage stakeholders in forestry decision-making, descriptive evidence can offer a powerful alternative to a strict adherence to reductionist neo-classical economics (Foster 1997).

This paper draws from experiences with 'EFORWOOD-IP: Tools for Sustainability Impact Assessment of the European Forestry – Wood Chain', an EU funded research project which, through Work Package 2.3, has sought to capture the social and cultural values associated with forests. The paper discusses the extent to which the project has succeeded in developing and using a framework of quantitative and qualitative social and cultural values and indicators to assess impacts of changes in forest management in Europe.

EFORWOOD

EFORWOOD – IP is a four year Integrated Project involving 38 partner institutions from 18 countries, with a total budget of EUR 20 m, of which 13m is from the 6th Framework Programme of the European Commission. The project will run for four years and is due to finish in October 2009. The overall aim is to develop a computer-based decision-support tool ('ToSIA') for the sustainability impact assessment of forestry wood chains in Europe. EFORWOOD considers the entire forestry wood chain from forest resource management (covered by Module 2 of the project), forest-to-industry interactions (Module 3), industrial processing and manufacturing (Module 4), and industry-to-consumer interactions (Module 5). There are various actual or possible chains that run through these four steps, as defined by different processes such as planting, thinning, harvesting, and transport to roadside.

Box 1: EFORWOOD Sustainability Indicators

Economic

1. Gross value added and gross domestic product
2. Production costs
3. Trade balance
4. Resource/material use
5. Enterprise structure
6. Investment in research and development
7. Innovation
8. Total production

Social

9. Employment
10. Wages and salaries
11. Occupational safety and health
12. Education and training

Environmental

13. Energy generation and use
14. Greenhouse gas balance
15. Transport
16. Water
17. Forest resources
18. Recycling and recovery
19. Emissions to soil, water and air
20. Tree species and protection status
21. Corporate responsibility
22. Generation of waste

Source: Rametsteiner *et al.* 2006

The computer-based tool, ToSIA, will assess the sustainability of a broad range of drivers, including policies and other external factors; technological innovations within the forestry-wood chain, and the relative merits of alternative forestry-wood chains. 'Sustainability' will be measured through a framework of indicators that cover the 'three pillars' of economy, society and environment (Box 1). The EFORWOOD indicator framework is a stand alone product of EFORWOOD and has been developed through consultation with European stakeholders from industry, non-governmental organisations and the European Commission. The goals of the project demand a broad and generic indicator set to reflect the pan-European scale, the broad nature of the drivers to be assessed, and the multiple ways in which they may impact on different stages in the forestry-wood chain. The options for indicator selection were limited by the availability of data, and the requirement for quantitative indicators that are sufficiently tractable for modelling purposes (Edwards 2006).

The ToSIA model is being developed in three test cases: Västerbotten in northern Sweden, Baden-Württemberg in southern Germany, and the Iberian peninsula. Module 2, which focuses on the forest management part of the chain, will work in these three areas, and six other Reference Regions across Europe: Silesia in Poland, Lorraine and Aquitaine in France, an alpine region in Austria, Scotland, western Portugal, and Catalonia in Spain. The aim of the overall project is to cover between 60 and 80 percent of the wood flow in Europe, and the Reference Regions have been chosen to ensure that all major forest types and tree species are covered sufficiently to reach this target.

An important step within Module 2 was to identify five Forest Management Alternatives (FMAs), so that the majority of silvicultural options in Europe can be expressed through different proportions of these alternatives, as follows:

- dendro-biomass production,
- intensive even-aged forestry,
- ‘multi-functional’ forestry,
- close-to-nature forestry,
- unmanaged forest nature reserves.

The alternatives represent a continuum from intensive production to non-intervention forest management. They are generic, and need to be interpreted differently in each Reference Region. Together, they provide a useful framework for cross regional comparison. The work of Module 2 considers the impacts of shifting the proportions, and spatial distribution, of these alternatives in a given region in Europe on the various sustainability indicators. It also provides data on wood available for harvesting under different combinations of FMAs which will be taken up by Module 3 and subsequent steps in the sustainability assessment of the chain.

Within Module 2, there is a work package devoted to ‘social and cultural values’ (WP2.3) which aims to quantify and describe causal links between changes to forest management and social indicator values. The rest of the paper considers research to date on WP2.3, and in doing so explores the limits of quantification and modelling of social and cultural values associated with forests in Europe within sustainability impact assessments.

REVIEW OF SOCIAL AND CULTURAL VALUES AND INDICATORS

The main task of WP2.3 during its first year was to clarify the scope of social and cultural values (SCVs) that are associated with forests in Europe, and to explore ways in which these are currently quantified and described, in particular through the use of Criteria and Indicators (C&I) as part of contemporary approaches to Sustainable Forest Management (SFM). A comprehensive literature review was carried out of descriptions and typologies of SCVs and of relevant national and international processes that are developing C&I. Given the huge scope of this task, the review focused on a small number of key studies and well-established indicator frameworks. A generic framework of C&I for SCVs for Europe was proposed in the report (see Edwards 2006).

The task of producing an indicator framework for SCVs, and determining their responsiveness to forest management alternatives, presents numerous challenges, in particular for the intangible, non-market public benefits of forests. Attempts to quantify these, for example through contingent valuation or hedonic pricing methods, are often inappropriate or unreliable. Intangible SCVs are also hard or impossible to separate from each other, and tend to be referred to by undifferentiated labels such as ‘quality of life’ or ‘cultural heritage’ (Edwards 2006). The generic template of SCVs and indicators developed during the review used a thematic approach, and nine themes representing different groups of benefits or values were identified as follows:

1. Employment
2. Harvesting (NTFPs)
3. Governance
4. Community
5. Recreation and tourism
6. Education and learning
7. Health and well-being
8. Landscape and aesthetics
9. Cultural and heritage

The themes were further subdivided into 42 sub-themes, for which a total 72 indicators were described (Tab. 1). The value in developing a typology of SCVs should not be downplayed, since the social benefits of SFM assessment and monitoring remain in their infancy. It is acknowledged that SCVs are not being ad-

Tab. 1. Generic template of social and cultural values associated with forests in Europe: themes and sub-themes

Theme	Sub-theme
1. Employment	Level of employment
	Wages and salaries
	Occupational safety and health
	Education and training
	Quality of employment
	Volunteering in forest management
2. Harvesting (NTFPs)	NTFP production and revenue
	Participation in NTFP collection
	Benefits derived from NTFP collection
	Access and rights to NTFPs
3. Governance	Public involvement in forestry decision-making
	Social inclusion
	Awareness among forest managers
	Public attitudes towards forests and forest management
4. Community	Community involvement in forest management
	Rights of local communities [social justice]
	Community well being
	Local employment and training
	Local attitudes towards local forests
5. Recreation and tourism	Recreation resources
	Access to recreation
	Level of informal recreation
	Level of formal recreation
	Social interaction
	Value of recreation and tourism
6. Education and learning	Quality of visit experience
	Expenditure on education and learning
	Extension and outreach
	Education facilities and institutions
	Beneficiaries of education and learning
	Quality of learning experience
7. Health and well-being	Public awareness of forests and forestry
	Physical activity
	Mental well-being
	Quality of health related experience
	Value of health benefits

Theme	Sub-theme
8. Landscape and aesthetic	Expenditure on enhancing landscape with forest and trees
	Contribution to forests and trees to landscape
9. Culture and heritage	Expenditure on cultural resources
	Cultural and historical resources
	Beneficiaries of cultural resources
	Cultural associations with forests

Source: Edwards 2006.

ressed adequately within the development of C&I for SFM and that social impact assessment needs more systematic application in forestry (Raison *et al.* 2001). Templates of this kind can help European researchers, statisticians and policymakers determine priorities for data collection and indicator development (Segnestam 2002). However they must be seen as evolving and flexible to local contexts.

A number of useful approaches to categorising and valuing SCVs were identified in the review, in particular a pragmatic, policy-oriented typology developed by a recent valuation of the economic and social benefits of 'forestry for people' in Scotland (Hislop *et al.* 2006), and the 'ecosystem functions' approach used for example by the Millenium Ecosystem Assessment (Chiesura and de Groot 2002, de Groot *et al.* 2002, de Groot and Ramachrishnan 2005). Other typologies of SCVs included those proposed by Bass (2001: 21), Collins and Roper (1999) and Willis (2003). Economic categories of value include those outlined by More *et al.* (1997) and Slee *et al.* (2004) but these were seen to be of less potential application in the context of EFORWOOD.

Various ways to structure indicator frameworks were reviewed. A project-based framework was seen as relevant to our SCV template with a useful distinction between input, output, outcome and impact indicators (Segnestam 2002). Output and outcome indicators are usually preferred to input indicators, but they are typically harder to develop and use (e.g. Raison *et al.* 2001). The United Nations Commission on Sustainable Development (UNCSD) and the Millennium Development Goals both use a simple thematic framework that resembles the one developed here (Segnestam 2002).

Several existing C&I frameworks were examined to identify individual indicators that may be appropriate for the SCV template, in particular the pan-European

(MCPFE) process, the Montreal Process, the CIFOR C&I generic template, the UK Indicators of Sustainable Forestry, but also indicator sets used by the Canadian Council of Forest Ministers, the Global Forest Resources Assessment, and the EU Sustainable Development Indicators.

The review concluded that four kinds of indicator need to be proposed in the template, according to the nature of different SCVs and appropriate methods for their assessment as follows:

- economic (value expressed in money terms),
- quantitative (absolute numbers or percentage),
- qualitative (ordinal ranking),
- descriptive (using common criteria for comparison).

Three dimensions were identified when considering each SCV theme, as follows:

- Resources: forests, woodlands and trees in a landscape, and man-made facilities, sites and features,
- Activities: forest-based livelihood strategies, ways of life, activities and practices,
- Meanings: norms, values, beliefs, attitudes, expressions, identities, meanings and associations different people attach to forests and their use.

These dimensions are inter-linked. People attach particular meanings to forests, which, in turn, are shaped by the activities or livelihood strategies they carry out in them. Cultural landscapes are examples where the interactions between these three entities are particularly strong. Each theme in the template can be seen to involve all three dimensions, but in the template only the 'culture' theme does so explicitly. Thus, we value 'employment' not just for the money, but for the activity itself, and for the meanings and identity and other cultural benefits we associate with a given job. The themes 'employment' and 'extraction' are also focused on 'resources' whereas the 'cultural' theme is more focused on 'meanings'.

The template used these distinctions as a checklist to identify relevant indicators for each theme. It needs to be seen as work in progress, and will be revised in response to expert consultations and fieldwork with stakeholders in different Reference Regions throughout Europe. It is hoped that the end product will be used to increase the range and depth of coverage of these often-neglected values in assessments and decision-making for sustainable forest management in Europe.

CAPTURING SOCIAL AND CULTURAL VALUES WITHIN IMPACT ASSESSMENTS

As outlined earlier, the overall approach of Module 2 is to consider the impacts of different proportions of the five forest management alternatives on economic, environmental and social indicators. The FMAs are defined in terms of silvicultural variables such as stand age, density, and species composition, and can be located on a continuum from maximum financial benefits to maximum ecological benefits. It is not yet clear how social benefits may change along this continuum. Firstly, it depends upon which 'social benefit' is being assessed. Levels of employment may be higher for intensive production forestry, but landscape amenity value may be lower. The main purpose of WP2.3 is to explore how different social values are influenced by these different FMAs.

To ensure that there is meaningful inclusion of social and cultural values within Module 2, it is necessary to adopt a wider definition of forest management: one that includes non-silvicultural as well as silvicultural interventions. These include:

- On-site infrastructure (such as trails, visitor centres, car parks, etc),
- On-site services (such as rangers leading nature walks, events, café facilities),
- Communication and promotion (including encouraging public consultation and participation).

The need to include non-silvicultural activities is relevant to a lesser extent to environmental values associated with forests. To optimise biodiversity benefits, a range of non-silvicultural investments are carried out by forest managers, such as reclaiming former peat bog areas in Scotland, or creating ponds or other wildlife habitats. If we extend the definition of forest management in this way it is also necessary to work at the landscape level, and not just the stand level. Many social indicators (and environmental ones) only make sense at landscape level, although the quantitative social indicators given in Box 1 can be calculated largely at stand level.

To ensure social aspects are incorporated effectively into the ToSIA model, the selection of indicators for social values needs to be tangible and quantifiable, and with clear causal links with the drivers that are being assessed. Thus, the social indicators given in Box 1

(employment, wages and salaries, occupational health and safety, and education and training) are all relatively unproblematic. For example, it is possible to predict the impact of changes to forest management on employment, and wages and salaries, quite easily, since the causal links are quite clear and there is sufficient data and/or credible expert opinion to provide indicator values for a range of forest management alternatives and their constituent processes.

DEVELOPING AND INDICATOR FOR 'RECREATIONAL USE OF FORESTS'

To go beyond these narrow employment-related indicators, the main innovation within the WP2.3 research agenda is to develop an indicator for 'recreational use of forests'. Recreational use in its broadest sense means visits to forests by members of the public during their spare time, i.e. non-work and non-livelihood related. Thus, by assessing recreational use we assess all the direct use values people attach to forests, which cover all the nine themes in the SCV generic template with the exception of 'employment', and 'harvesting'. 'Recreational use' fails to capture 'non-use' values people attach to the existence of forests. It also fails to capture use values associated with seeing trees and woodlands in the landscape when the woodlands themselves are not actually visited. (This value belongs best under the theme 'landscape and aesthetics'). To incorporate recreational use into impact assessment procedures and tools would be a major step towards a 'three pillars' approach to sustainability assessment. To date, treatment of social values is restricted to employment related values, which entirely fails to capture the benefits of forests derived by the majority of the European public.

Two other social indicators were considered, but rejected from the research agenda: 'community participation' and 'consumer attitudes'. Both are only weakly determined by silvicultural changes, and influenced more by wider interventions in forest management such as investments in public consultation and public education. Since the focus of Module 2 is on the impacts of silviculture, indicators were chosen that have at least some relationship with silviculture. Silvicultural changes probably do have a significant impact on consumer attitudes but these are hard to define

and model for the whole of European society. Also, the causal links are more complex, and act in both directions. Furthermore, 'recreational use' already takes into account one important dimension of 'consumer attitudes,' namely attitudes towards forest as an attractive place to visit. Finally, there is unlikely to be much useful data on community participation and consumer attitudes at the European level. Even for 'recreational use' it will be hard to put together much credible data, and the work in this area will need to focus primarily on recreational use as a qualitative indicator that shows direction and scale of change rather than absolute levels of recreational use.

Quantitative measures of recreational use can act as a proxy for most of the tangible and intangible benefits that the public gains from direct use of forests in Europe. Crudely put, the greater the number of visits or visitors, the greater the public benefits provided by forests. But it is not as simple as that. For a complete assessment, we would also need to take into account quality of visit experience, and the kind of people who make the visits. We may also wish to differentiate between forest types or regions within Europe. If forestry agencies simply sought to increase number of visits, and treated all visits to all forests by everyone as of equal value, then they could build tourist attractions or shops at the car park area. Visit numbers would increase, but visitors might not be visiting the woodland itself, or if they did they might not stray very far from the car park. Their experience might be similar to a visit to an urban park. Forests in Europe can offer unique experiences of engagement with nature and wilderness, and associated intangible benefits such as well-being and spiritual connection to the environment, and arguably it is these that should be valued by impact assessment tools. Assessments of such uniquely woodland-related benefits need to be disaggregated from other kinds of benefit which are more generic.

The number of adult visitors to forests in a given country can be assessed through household surveys that ask a sample of the population whether they visited a woodland or forest in the last 12 months, and then multiplying by the figure for the national adult population. More sophisticated questionnaires go further by asking how often each person visited in the last 12 months, allowing a figure for total number of visits to be derived. Another approach involves on-site surveys

at particular woodlands, which can, in theory, be scaled up to the national level, although with very poor levels of confidence.

COST Action E33 has brought together all available household surveys on forest recreation that have been carried out in European member states over the last 30 years. Their work reveals that there are substantial problems comparing totals for different countries. At best the available data can only provide a crude measure of levels of recreational use across Europe, and it may not be sufficiently sensitive to respond accurately to changes in drivers such as new forestry policies that promote recreational use (Edwards *et al.* 2007). Such changes might be more reliably assessed at the case study level where the drivers and the indicator value can be measured or described accurately. However, the aggregate data on levels of recreational use are helpful for two reasons:

- to express the baseline situation regarding recreational use (and thus SCVs) and to show differences in that baseline between regions, forest types and social groups across Europe, and
- to express predicted impact on recreational use due to future scenarios, such as changes in forest management, e.g. by predicting that scenario X would increase visit numbers from, say, 30 m to 40 m per year.

To assess how certain scenarios impact on levels and quality of recreational use for different kinds of people in different kinds of forest, a research agenda has been developed that operates on different levels through the use of: a) case studies, b) literature reviews, and c) expert networks. These are outlined in turn below:

Case studies

Case studies are being carried out in Scotland and, provisionally, Baden-Württemberg, using qualitative and quantitative methods including accompanied site visits, interviews and questionnaires. The research is assessing the relative importance of groups of factors, such as changes to 'silviculture', 'infrastructure', and 'physical attributes of the site'. Within silviculture, the case studies are examining the impact of different silvicultural factors, in particular stand age, species, and stand density.

Conclusions are being made on two levels: stand level, and forest, landscape or regional level. At stand

level we will conclude that particular silvicultural factors cause particular changes to quality of recreational experience for different kinds of visitor in different forest types in different parts of Europe. We may be able to show the direction of change, and give some indication of scale of change, and rank the relative impact of different silvicultural factors.

At forest level, we go further by assessing the impacts of non-silvicultural factors such as on-site recreational facilities, which only make sense when examined at the forest level. For example, it may be possible to say that an investment of X Euros in a given forest led to an increase in visitor satisfaction of Y% or to an increase in visit numbers of Z%. Less ambitiously, we should be able to show the direction and approximate scale of change for given investments. This could be expressed as an average per hectare of forest of a given type that is accessible to the public for a given region or country. Alternatively, the impact at forest level could be scaled up, and expressed for a given European NUTS region.

Also at the forest level, we can assess the impact of spatial distribution of different silvicultural options, managed at stand level, and other spatial factors such as the layout of pathways and other recreational features. A forest can be zoned into blocks with different primary uses, and in doing so the manager can optimise competing economic, ecological and social values or functions. Thus, a change from 20% FMA '1' to 50% FMA '1' could lead to 30% increase in timber revenue, but also a 20% decline in recreational value (expressed in terms of individual visitor preferences, and/or total numbers of visits), if the change was applied uniformly across all forests in the forest estate in a particular NUTS region. However, concentrating FMA '1' in particular forest blocks or zones, away from areas managed for recreation, might produce a 25% increase in timber revenue overall while recreational value might only decline by 5%.

The impacts of spatial distribution are hard to express at the stand level. However, instead of giving a single indicator value for the impact of a particular change in forest management, alternative indicator values could be given which cover possible scenarios of spatial distribution of stands managed with different forest management alternatives. In other words, there might be three broad kinds of scenario that need to be

applied within Module 2 that maximise, respectively, timber production, biodiversity conservation, and recreational use. These scenarios could then consider the spatial distribution of stands and other spatial features such as pathways and facilities.

Literature review

A literature review is being carried out to determine the impact of silvicultural and non-silvicultural factors on recreational values of forests across Europe. The review covers three overlapping areas, as follows:

- Preference studies, which determine impacts of silvicultural variables such as stand age, density and species composition on public preferences. This work is largely concerned with stand level variables, but some of it may also have been carried out in the context of an entire forest or landscape (e.g. Brown and Daniel 1986, Silvennoinen *et al.* 2002).
- Economic research that calculates willingness to pay for silvicultural and other forest management changes. The silvicultural changes are probably at stand level, while any work on non-silvicultural changes such as investments in facilities, will probably be at forest level (e.g. Willis *et al.* 2003).
- Modelling of forest visit numbers according to several on-site and off-site variables, including both silvicultural factors, non-silvicultural factors, and attributes of the site, alternative sites, and the catchment population. This will have been done for particular forests, with a view to generalising about any forest in a given region (e.g. Brainard *et al.* 2001, Hill *et al.* 2003).

The following formula, adapted from Hill *et al.* 2003, summarises the scope of the variables being considered by the review:

$$V = f(\text{Phy}, \text{Silv}, \text{Infra}, \text{Serv}, \text{Comm}, \text{Popn}, \text{Subs}, \text{Char})$$

Where:

V = number of visits to a given forest

On site variables:

Phy = physical attributes of site

Silv = silvicultural attributes

Infra = infrastructure on site

Serv = services on site (catering, organised trips)

Comm = communication, promotion, outreach, media

Off site variables:

Popn = population within a certain travel time

Subs = substitute recreational sites (forest and non-forest)

Char = socio-economic characteristics of surrounding population

In addition there are cultural factors that can help to explain regional differences within Europe, for example different attitudes towards forest recreation held by different social groups in society.

The review is producing a wealth of information that describes and quantifies public preferences for particular silvicultural and non-silvicultural factors. The quantitative measures of preferences will be relative (ranking on an ordinal scale) or absolute (economic values from WTP studies). The information will be primarily abstract, at 'stand level', i.e. taken out of the context of a given forest. Initial results to date are given in Box 2.

Box 2: Public preferences for silvicultural attributes at stand level

In general, preferences appear to increase with the following changes:

Species

- More broadleaves, fewer conifers, some species diversity

Age

- Increased stand age, more older trees

Density

- Decreased stand density – more visual penetration
 - Thinning is generally an improvement
 - Less clear-felling, more natural regeneration with seed trees

Ground cover

- Less slash, residue and products on-site
 - More ground vegetation – but not too much

Appearance

- Natural and semi-natural-looking

Once analysed, the conclusions from the review will help to build an assessment of the impacts of particular scenarios on public preferences. The next logical step

would be to attempt to translate changes in public preferences into changes in number of visits, by taking into account conclusions from the literature which seeks to model visits to woodlands, outlined above. Clearly, at European level, this is an ambitious task, and the results will only be indicative.

Expert network

Finally, an expert network is being set up and used to integrate and refine the conclusions from the (bottom up) case studies and the (top down) literature review, and incorporate additional evidence and insights from experts, through email conferences and workshops. The first objective is to generate consensus on the impacts of different factors on public preferences, and, in turn, on levels of recreational use. A second objective is to work with forest modellers to try to incorporate these conclusions into the ToSIA model being developed by EFORWOOD.

CONCLUSIONS

Such a synthesis of the impacts of forest management on direct use values of forests by the European public has not been attempted before, and should add significantly to our knowledge of how to assess the social sustainability of the forestry sector, and the impacts of European policies and other drivers on social and cultural values. The exercise is going to be tentative and exploratory. Few concrete generalisations may be made, but part of the research will be to explore critically the limits to the quantification and modelling of SCVs. Overall it will allow us to propose how a broader range of SCVs held by European citizens might be incorporated into impact assessment procedures in Europe.

Turning to the issue of forestry for rural development – the theme of the IUFRO conference – it is worth highlighting that levels of recreational use can act as a proxy for the often considerable expenditure in the local economy that is attributable to forest related recreation and tourism. The direct, indirect and induced employment, and contribution to the economy, of forest-related (where forests are the primary purpose of the visit) and forest-associated (where forests are of secondary importance) recreation and tourism can be calculated for example through the use of multipliers.

This has been done in Scotland and provides additional evidence of the public benefits of forests (Hislop *et al.* 2006). However, such values are not considered to be part of the WP2.3 research agenda, being more appropriately considered under the 'economic' pillar of sustainability.

The limits to modelling and quantification are brought home in this paper which shows how several SCV sub-themes cannot be assessed through a model such as ToSIA, or indeed through any quantified analysis. Of equal importance are the wider sociological critiques of the quest for quantification and monetarisation of public benefits. Such critiques recognise that there are multiple perspectives on what 'sustainability' means, for example depending whether a stakeholder is predominantly influenced by a pan-European policy oriented view, or that of a local citizen impacted upon by a given European policy. Often such perspectives are incompatible, and attempts to solve these essentially political problems through increasing appeal to technocratic rationality may never succeed. It is argued that the answer lies in a greater role for deliberative democracy in the decision making process (see Owens and Cowell 2002, Owens *et al.* 2004), and stakeholder participation in the process of sustainability impact assessment. Participation can increase the legitimacy of a tool like ToSIA tool, as well as the quality of the science upon which it is based. Ways to achieve this go beyond the scope of the project, but have been explored as part of a related Integrated Project, SENSOR (Tabbush *et al.* 2007). As highlighted by Bell and Morse (200, cf. Rubenstein 1993) those who develop and use tools such as ToSIA need to find a compromise between 'omniscient modelling' and 'stakeholder trading' if the tool is to make a credible contribution to sustainable forest management.

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